

ELASTIC DECK WEB

Field of Invention

5 This invention relates to the retention of items or other cargo on surfaces, particularly of transportation devices, wherein a one piece elastic net or web is provided to secure those items to the underlying surface.

Background of the Invention

10 Securement or retention of items particularly to relatively flat surfaces has long been a problem. A variety of solutions have been proposed with varying degrees of success. Numerous products are on the market such as tie down straps, bungee cords, and even an elastic netting which may overlies some portion of an item to retain the item in a cavity or on a surface. Bungee cords provide a convenient tool for tying down, or maintaining, the position of an article in a given location. They may be made of various stretchable materials and generally have opposite ends with hook shaped fasteners for ready attachment. Particularly challenging is retention of items to articles having convex surfaces such as the stern or bow of a kayak, where items such as additional clothing, water bottles, food containers, etc., tend to slide around or be swept off by the water current. Positive securement is essential in such applications.

15 Retention of such items has been attempted using multiple fabric coated or rubber tie down straps or bungee cords, either individually, or interfaced or knotted together at regular intervals to form a latticework. This provides an expensive product which must be configured to adapt to the size and shape of each item to be secured.

25 Another product available is a "bungee net" from Dowco, Inc. which comprises a latticework of regularly spaced rectangular openings formed by knotting together plastic cord. This product may be acceptable for retaining a regular shaped item, such as a

helmet, but like the individual tie downs or cords that may be combined in some manner, does not retain smaller or multiple items well.

5 All of the aforementioned items are generally attached by using a variety of metal hooks or clips which engage a fastener which projects from, or is adjacent to, the retention surface. These hooks are problematic as they easily engage any protrusion while they are being handled or stored making their use quite frustrating. Additionally, it has been recognized that these hooks present a real danger for face and eye injury when a person attaches and tensions a cord and the opposite end pulls loose and acts as a projectile towards the person.

10 Some patents have been advanced to overcome these above-identified problems, but none provide a total solution.

United States Patent No. 6,490,767, entitled "Bungee Cord with Hookless Ends" is directed at a molded plastic cord having a spade attachment end which must be twisted and inserted into a lock slot after being wrapped around an item to be secured.

15 United States Patent No. 4,435,102, entitled "Tie Down Connector" is directed at a releasable hooked end for a bungee cord which comprises a pair of registered and coaxially disposed semi-circular U-shaped recessed portions for engaging the supporting element and attached to the cord by a knot.

20 United States Patent No. 5,458,447, entitled "Cargo Restraint" is directed at a restraining device for the vehicular transportation of cargo comprised of weather resistant straps attached to each other to form a lattice webbing which may further include self-locking buckles and flat hooks.

25 United States Patent No. 5,673,464, entitled "Cargo Securement System and Tie Down Strap" is directed at a tie down strap having two end portions including securement members such as hooks, and a main body portion having a plurality of openings formed therein. Another strap may be passed through one of the openings to form bridge members of a cargo securement system.

Other known prior art include United States Patent 4,754,531, entitled "Elastic Tie Down"; United States Patent No. 4,769,875, entitled "Elastic Reinforced Tie-Down Strap and Method of Making Same"; United States Patent No. 2,991,524, entitled "Tarp Hold Down Strap"; United States Patent No. 3,231,950, entitled "Fastening Device" and
5 United States Patent No. D287099, entitled "Elastic Tie Down Strap".

Thus, a need exists for a one-piece elastic deck web that can be molded in a single operation and which can accommodate nearly any shape of object or objects and provide a secure, but safe attachment means. Particularly useful is a web which can be configured in shape to complement the surface that it will be attached to and/or the item
10 that it is intended to secure.

Summary of the Invention

In a first embodiment the present invention is directed at one-piece molded elastic deck webbing which provides containment, retention or securement of articles to a
15 surface or within a cavity. The webbing is preferably injection molded using, preferably, a thermoplastic or rubber elastomer to form an open, multi-polygonal pattern of struts having extensions along the periphery to accommodate attachment to a surface. The size, shape and geometric pattern of struts that form the web may be varied to accommodate different sizes, shapes and numbers of articles to be stored or retained. The size, shape
20 and geometric pattern of the web may further be varied to accommodate the shape and sweep of the surface which it will be attached to, e.g., relatively flat vs. curved vs. tapered in one direction (as would be found on the bow and stern of a kayak).

In a related embodiment, the present invention is further directed at a means for attaching the web to the underlying surface by providing grommets which protrude from
25 the periphery of the underlying surface, and a plurality of integrally-formed elastomeric hollow ends or sockets which are formed at the end of the extensions and engage the grommet tightly, preventing easy detachment (since any tension in the attachment socket

at the end of an extension which emanates from the web causes the integrally-molded elastomeric hollow sockets to neck down or reduce in cross-section which provides even greater retention force due to the contraction of the socket around the barbed end of the grommet).

5 It is thus an object of the present invention to provide a one-piece molded elastic deck webbing which provides cost, appearance and performance advantages over current products.

It is a further object to provide an attachment means for the elastic deck webbing to surfaces, particularly of convex shape, the attachment means being easy to install but
10 fairly difficult to detach and being molded of soft plastic or rubber thus not presenting a safety hazard.

It is still a further object of the invention to provide a one-piece molded elastic deck webbing for use on transportation devices, particularly kayaks.

It is a still further object of the present invention to provide a one-piece molded
15 elastic deck webbing which has multiple attachment points which serve to address the retention of various and complex shapes, but also provides securement of the cargo even if one or more of the attachments may come loose.

It is a still further object of the present invention to provide an attractive one-piece molded elastic deck webbing in a variety of geometric patterns having a spiderweb-like
20 irregular geometric arrangement which may be tailored to a specific surface to be covered or directed at specific shapes of cargo to be retained.

Other features and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompany drawings which illustrate by way of example the principles of the invention.

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Brief Description of the Drawings

FIG. 1 is a perspective view of a kayak having a prior art cargo retention device.

FIG. 2 is a plan view of one geometric pattern of the one-piece molded elastic deck web of the present invention.

FIG. 3 is a plan view of another geometric pattern of the one-piece molded elastic deck web of the present invention.

5 FIG. 4 is an enlarged partial cross-sectional view of the attachment socket of the web of FIGS. 2 and 3.

FIG. 5 is an enlarged view of the grommet which engages with the socket of FIG. 3.

10 Description of the Invention

For elements common to the various embodiments of the invention, the numerical reference character between the embodiments is held constant, but distinguished by the addition of an alphanumeric character to the existing numerical reference character. In other words, for example, an element referenced at 10 in the first embodiment is
15 correspondingly referenced at 10A, 10B, and so forth in subsequent embodiments. Thus, where an embodiment description uses a reference character to refer to an element, the reference character applies equally, as distinguished by alphanumeric character, to the other embodiments where the element is common.

20 Detailed Description of the Preferred Embodiments

As noted above, the present invention is directed at a one-piece molded elastic deck web which has use in the containment, retention and securement of items to a surface or within a cavity. In one particular example of prior art, as shown in FIG. 1, a kayak 10 comprises a bow section 12 and a stern section 14, each including a surface 16,
25 18 available for the retention of occasional use items within arm's length. These items may include food, water, clothing, etc. Disposed across these generally convex surfaces are shown elastic bungee cords 20, 22 for the potential retention of these items. The

cords 20, 22 are generally elastic with a fabric cover and may comprise one or more individual cords joined together at a center connector 24 and attached via hooks 26 or loops to fasteners 28 which may protrude from the surface 16, 18 of the kayak 10. As shown, the bungee cords 20, 22 comprise multiple components and are generally attached by a plurality of screw fasteners. Further, using one long cord 20, 22 as shown in FIG. 1, and knotting the ends together at the center 24 or by either lacing or knotting together multiples cords, there is a practical limit as to how many interconnections or struts that can be provided and the resulting pattern. Thus, to provide an ability to retain small as well as larger items with a single retention device, a one-piece molded assemblage of members or struts, particularly having a higher number, or density, of cross members, or struts, near its geometric center is preferred.

FIG. 2 provides one example of a retention device 40 having those characteristics. For example, for the stern surface 18 of the kayak 10 of FIG. 1, the molding of FIG. 2 provides four integrally molded attachment points or sockets 30 interconnected by a web 32 which comprises an assemblage of flexible members or struts 34. The specific pattern of the web 32 may be designed with the contour of the underlying surface and the specific items intended to be retained in mind. For instance, with the web 40 in FIG. 2, a larger item like a jacket or blanket may be retained by the longer extension struts 36 while the shorter struts 34 near the center 32 of the web 40 may be closer together, or of higher "density", to retain smaller items such as a cup or bottle. This retention device 40, an elastic deck web, works equally well to retain items stored in a cavity, say a pocket area formed into the stern portion 14 of a kayak 10 (see FIG. 1). Particularly with a convex surface as on a kayak, a one piece molded elastic web may be attached in such a way that it is stretched or pre-tensioned to ensure that even small or flat items will be retained.

An alternate design is shown in FIG. 3 as might be provided for the bow portion 12 of a kayak 10 (see Fig. 1). Here, five extension legs or longer struts 36A include

integrally molded attachment sockets 30A which emanate from a central region 32A of the web 40A, which is designed with the tapered (fore-aft) shape of the bow portion 12 of a kayak in mind. Again, the central region 32A of the web 40A comprises an assemblage of flexible members or struts 34A that may be intricately linked together to retain specific items to specific surfaces. By producing the web of the present invention is a single molding, virtually any geometric pattern or arrangement of struts 34, 34A and attachment extensions 36, 36A may be designed to complement specific storage requirements. While shown here by example for use on a kayak, the one piece molded elastic deck web may find use on any flat, convex, concave or complex surface where items need to be retained, stored or secured. Surfaces may include, but are not limited to, transportation devices (motorcycle fenders and storage racks; vehicle deck lids and trunks; car interior visors, seat backs and lower door panels, etc.), luggage (as a readily available storage device on the outside or inside of a suitcase), appliances (to retain items for handy use, say on the side of a refrigerator), furniture (as storage "pockets" on the side of a couch or chair), wall storage (say in a garage for neatly storing a variety of oddly shaped items), and in any application where bungee cords and tie downs currently find a use.

The one-piece deck web of the present invention is preferably molded of an elastic or elastomeric material such as a rubber or thermoplastic or thermosetting plastic. By reference, an elastomeric material is defined as a material that exhibits recovery from an applied deformation. Preferably, the web is molded of a thermoplastic rubber elastomer such as Dynaflex® G6730 from GLS Corporation, although other ethylene propylene type rubbers, thermoplastic rubbers, thermoplastic vulcanizates, thermoplastic elastomers and blends, alloys and combinations of those with thermoplastic olefins may also be used. In addition, various other thermoplastic materials qualify as elastomeric materials for use herein, and may include thermoplastic polyurethanes, thermoplastic polyesters, thermoplastic elastomers (TPE's), natural or synthetic rubbers based upon diene polymer structure, such as polyisoprene, polybutadiene, chloroprene rubber,

styrene-butadiene rubbers, etc. Other elastomeric materials may include polysiloxane based polymers and certain nylon block copolymers.

Preferably, the elastomeric plastic or rubber used to form the present invention will have more than about 500% elongation without breaking, although elongation values from about 100% to about 1000% may also be used. In addition, the use of softer polymer or rubber compositions, preferably below about 50 Shore A, will provide a somewhat tacky or sticky surface which provides a better grip for additional retention, particularly of more rigid items, from sliding relative to the web.

In an alternate embodiment, the struts 34 34A or extensions 36, 36A of the present invention may be locally reinforced during the molding process by placing sections of threads or fibers or cords in the mold to provide additional strength and less elasticity in a specific portion of the web.

The elastic deck web of the present invention may be molded using any of the known plastic and rubber molding processes in the art, including but not limited to injection molding, compression molding, injection compression molding, transfer molding, casting, reaction injection molding, co-extrusion, etc.

While the elastic deck web of the present invention as shown in FIGS. 2 and 3 may have preferred dimensions of about 10 inches wide by about 20 inches long, there is no practical limit as to the size that may be molded. Further, the elastic deck webs of the present invention as shown in FIGS. 2 and 3 may have attachment extension and struts which are about 0.375 inches wide and 0.125 inches in thickness, however there is no practical limit as to these dimensions, commensurate with the length and width dimensions of the web and load forces expected to be encountered from the size or shape of the item which is to be retained.

Turning now to the attachment means for releasably attaching the elastic deck web of the present invention to an adjacent or adjoining surface, the integrally-formed attachment sockets 30, 30A of FIGS. 2 and 3, respectively, are shown in an enlarged side

view in FIG. 4. The molded attachment **30B** comprises a head portion **42** which is integrally molded with an attachment extension **36B** which emanates directly or indirectly from the center region **32, 32A** of the web **40, 42A** (see FIGS. 2 and 3) and a hollow socket portion **44**, shown here in partial cutaway view to illustrate the hollow portion **46**. The hollow portion **46** is dimensioned to engage a grommet **50** having a diameter **56** slightly larger than the hollow portion **46** to provide a friction fit such that the hollow section **46** expands slightly when engaging the grommet **50**.

FIG. 5 is a side view of a grommet of the present invention. The grommet **50** comprises a bulbous head **52** and a shaft **54** of smaller diameter which can fit through a properly sized hole in a surface for mounting the deck web **10**. The shaft **54** of the grommet **50** may further comprise one or more ridges or barbs **56, 57** formed to retain the grommet **50** in a surface (for instance **56**) and also to retain the hollow socket portion **46** of the integrally molded attachment **30B** to the grommet **50** (for instance **57**). Alternatively, the grommet may be integrally formed with the mounting surface or comprise other projecting means including, but not limited to, screws, snaps, caps, X-mas tree fasteners, etc. which may engage with the hollow socket. Two specific aspects of the design of the attachment means provide for secure attachment and a releasable feature of some difficulty. Preferably, the grommet **50** protrudes at a nearly normal angle to the surface on which items will be retained and attachment to the extension **36B** of the web **40** is such that tension in the extension is not working directly to separate the socket **30B** from the grommet **50**, but is vectored nearly at right angles to the grommet. Further, the design of the hollow socket which comprises relatively thin walls **48** of an elastic or elastomeric material, when engaged with the barbs **57** of the grommet **50**, insures that when the socket **30B** encounters a tensile force, the walls **48** of the socket **44** elongate and neck down, providing a contraction of the socket portion **44** over the barb **57** of the grommet **50** providing even greater resistance to removal from the grommet **50**.

A further advantage of the one piece molded elastic deck web of the present

invention is that with a plurality of attachment points, should one of the attachment extensions break or become detached, the web configuration and other attachment points may still retain the item in a secure manner.

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Industrial Applicability

It is envisioned that the one piece molded elastic deck webbing of the present invention may have applicability to retain, secure, store, package, contain or hold items in a wide variety of applications including, but not limited to, convex surfaces on all types of transportation devices, both exterior (kayak, motorcycle, car deck lid) and interior (replacing trunk netting, on sun visors, seat backs and lower door panels) applications. 10 Additionally, any surface having a convex shape (suitcase side, appliance door, etc.) will benefit from this invention, as additional items, e.g. lap top computers, may be easily retained adjacent the side of the suitcase, providing additional storage capacity.

Further, items having a concave shape or cavity space may use the invention to 15 prevent stored articles from falling out, as the webbing may be provided with an intricate pattern of flexible struts and extensions including multiple attachment points which may be engaged around the edge or periphery of the cavity.

Still further, the web may be formed into a three dimensional form, rather than a flat shape, to accommodate the storage of specific items (e.g. a laptop computer to an 20 outer surface of a suitcase).

The description and drawings illustratively set forth the presently preferred invention embodiment. We intend the description and drawings to describe this embodiment and not to limit the scope of the invention. Obviously, it is possible to modify these embodiments while remaining within the scope of the following claims. 25 Therefore, within the scope of the claims one may practice the invention otherwise than as the description and drawings specifically show and describe.